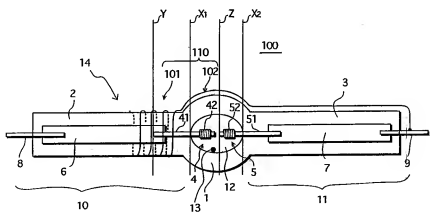
REMARKS

The present invention is directed to a high pressure discharge lamp where voltage pulses of at least 5 kV are applied between the electrodes in order to initiate a discharge. The present invention seeks a significant decrease in a voltage pulse generated to drive a lighting device to thereby enable a miniaturization of a lighting device with appropriate cost savings in the utilization of expensive parts such as a transformer installed in a lighting device. Additionally, a voltage resistance of other electronic components can be appropriately lowered, thereby providing a reduction in both size, weight and cost.

The noise that can occur upon the generation of a high voltage pulse can further be decreased, thereby allowing for an elimination of operational errors in any surrounding circuitry that would usually be caused by such noise.

Our present invention is disclosed in Figure 1 as follows:

FIG.1



As can be seen above, our external leads 8 and 9 are connected to molybdenum foils 6 and 7 with the actual electrodes 4 and 5 provided with electrode coils 42 and 52 adjacent to tips of the electrode. The lead portion which extends from our wound portion extends across the light-emitting part in proximity to come in contact with an outer surface of the light-emitting part, to a side of the discharge lamp in which the second sealing part is disposed. At least a section of the wound portion is wound substantially spirally at least 0.5 turns in a range from a second reference plane to a third reference plane and a closed loop is not provided around one of the light-emitting parts in the first sealing part within the range where the 2nd to 3rd reference planes are parallel to a 1st reference plane orthogonal to our bulb longitudinal direction. The 2nd reference plane and the 1st reference planes along the first sealing part have a predetermined distance and the 3rd reference plane passes through a tip of the electrode near the second sealing part.

Accordingly, in response to an application of a preliminary high frequency voltage before the lamp lighting is initiated with the application of a high voltage pulse, a high frequency magnetic field is effectively generated in the discharge space in addition to the high frequency electric field which results in a significant increase in the amount of initial electrons in the discharge space, thereby suppressing the breakdown voltage to a relatively lower value.

As the Examiner is aware, this is a relatively crowded and highly competitive field with a large number of international companies trying to achieve a higher light efficiency and long life at a lower cost. Accordingly, these factors should be taken into consideration when determining the patentability of our current claims.

> "Thus when differences that may appear technologically minor nonetheless have a practical impact, particularly in a crowded field, the

decision-maker must consider the obviousness of the new structure in this light."

Continental Can Co. USA Inc. v. Monsanto Co., 20 U.S.P.Q. 2d. 1746, 1752 (Fed. Cir. 1991).

Claims 1, 4-7 and 12 were rejected over *Honda et al.* (U.S. Patent Publication 2001/0003411).

A high-pressure discharge lamp recited in Claim 1 of our present application has the following features (marked by A through C2).

A high-pressure discharge lamp comprising:

(A) a bulb that includes a light emitting part having an electrode pair disposed and a discharge. space armed therein, and a first sealing part and a second sealing part provided at different ends of the light emitting part; and

(B) a proximity conductor formed from a lead wire, a section of the lead wire being wound around an outer circumference of at least one of the first sealing part and a section of the light emitting part to form a wound portion, and a remaining section of the lead wire forming a lead portion that extends from the wound portion across the light-emitting part in proximity to or contacting with an outer surface of the light emitting part, to a side of the discharge lamp on which the second sealing part is disposed, wherein

(C)(C1) The lead portion is electrically connected to the electrode of the pair, positioned nearer the second sealing part, and

(C2) at least a section of the wound portion is wound substantially spirally at least 0.5 turns in a range from a 2nd reference plane to a 3rd reference plane, and a closed loop around one of the light emitting part and the first sealing part does not exist within the range, where the 2nd to 3rd reference planes are parallel to a 1st reference plane lying orthogonal to a bulb longitudinal direction and including an end of the discharge space positioned at a base portion of the electrode nearer the first sealing part, the 2nd reference plane being distant 5 mm from the 1st reference plane along the first sealing part and the 3rd reference plane passing through a tip of the electrode nearer the second sealing part.

According to Claim 1 (hereinafter referred to as the "present invention"), the wound portion of the proximity conductor is configured as described in the above feature (C2). In response to an application of a given high-frequency voltage before the lamp lighting is initiated by application of a high-voltage pulse, a high-frequency magnetic field is effectively generated in the discharge space, in addition to the high-frequency electronic field, which results in dramatic increase in an amount of initial electrons in the discharge space, thereby suppressing the breakdown voltage to a low value.

Claims 1, 4-7 and 12 were rejected under 35 U.S.C. §102(b) as being anticipated by the *Honda et al.* U.S. Patent Publication 2001/0003441.

Figures 1-6 of *Honda et al.* the reference disclose the following configuration:

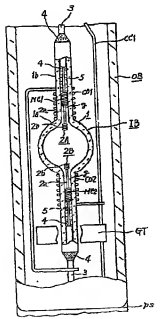


FIG. 6

The high intensity discharge lamp includes metallic coils CO1 (CO2) spirally wound around the small-diameter cylinder 1b of the light transmissive ceramic discharge enclosure 1. One end of the metallic coil CO1 (CO2) closer to the small-diameter cylinder is coupled to the feed conductor 3 that is connected to the other electrode to have the same potential as the other electrode.

Indeed, according to the invention of the reference, as shown in Figure 1, each of the metallic coils CO1 and CO2 is spirally wound around the small-diameter cylinder lb.

> [0045] Further, it is preferable that the metallic coil is wound on the small-diameter cylinder as tight as possible.

However, since the lead portion coupled to the feed-conductors 3 that is connected to the other electrode is positioned away from the enclosure 1a, it cannot be construed that the reference discloses the configuration of the latter half of our Claim 1 feature (B) that is "a lead portion that extends from the wound portion across the light emitting part in proximity to or contacting with an outer surface of the light emitting part, to a side of the discharge lamp on which the second sealing part is disposed."

In addition, the Abstract, Claim 6 and Specification [0090] of *Honda et al.* describes that "the winding pitch of each of the metallic coils CO1 and CO2 resides in a range of 100%-500%." Furthermore, Specification [0093] describes that "though the coils touch each other between turns next to when the winding pitch is 100%, it cannot be the problem especially."

However, if adjacent turns of the coils touch each other, short-circuiting occurs at those contact points, and a plurality of closed loops are then formed around the small-diameter cylinder. Consequently, a high-frequency magnetic field cannot be effectively generated in such

an environment. Thus, the invention of the reference does not produce the same effect as with the present invention nor does it recognize and teach the features of our present invention.

The high-intensity discharge lamp of the reference does not include the gist of the present invention of reducing a breakdown voltage by spirally winding the proximity conductor in a given range without forming a closed loop, which facilitates generation of a high-frequency magnetic field prior to the lamp lighting.

> "A reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant." *In re Gurley,* 27 F.3d 551, 553 (Fed. Cir. 1994); *see KSR,* 127 S. Ct. at 1739-40 (explaining that when the prior art teaches away from a combination, that combination is more likely to be nonobvious). Additionally, a reference may teach away from a use when that use would render the result inoperable. *McGinley v. Franklin Sports, Inc.,* 262 F.3d 1339, 1354 (Fed. Cir. 2001).
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> *In re Icon Health and Fitness, Inc.* 2007 U.S. App. Lexis 18244, *10

In addition, the *Honda et al.* reference relates to a metal halide lamp whose discharge enclosure is made of ceramics. With such a configuration of a discharge enclosure, as shown in Figure 2, a diameter of each of the axis portion 2a and coil portion 2b of the electrodes 2A and 2b is smaller than an inner diameter of the small-diameter cylinder lb to leave a narrow gap g between the small-diameter cylinder lb and the first and the second electrodes 2A and 2B. An end part of the small-diameter cylinder lb is externally sealed with the sealant 4. The metallic coil CO2 is merely wound around a portion of the small-diameter cylinder that is closer to the light emitting part than the sealing portion of the sealant 4 and that corresponds to the narrow gap g.

Accordingly, the *Honda et al.* does not suggest nor teach our feature (B) that is "a section of the lead ware being wound around an outer circumference of at least one of the first sealing part and a section of the light emitting part to form a wound portion."

As described above, the function taught by *Honda et al.* is as follows. The metallic coil is formed around an outer circumference of the small-diameter cylinder lb corresponding to where the narrow gap g is. By making a potential of the metallic coil the same as that of the other electrode, an electric field can be generated between the metallic coil and the axis portion of the electrode around which the metallic coil is wound [0098]. Thus, initial electrons in the narrow gap g are increased so that the discharge is easily generated between the electrodes [0103].

According to this technical idea, from the standpoint of enlarging an area influenced by the electric filed of the narrow gap g, it may be desirable to increase the winding pitch of the metallic coil. However, even if adjacent turns of the coil touch each other and thereby reduce the winding pitch, merely the winding number should be increased. Thus, the winding pitch does not matter in the reference [0092, 0093].

Accordingly, prior to the priority date of the present application, usually a proximity conductor was provided in order to generate an electric field in the narrow gap g communicating the discharge space and thereby increasing initial electrons to lower the breakdown voltage. In view of the conventional practice, therefore, *Honda et al.* would hardly be applied to a sealing part directly provided adjacent to the light-emitting part, as with the high-pressure discharge lamp of the present invention.

The reason of the above assertion is as follows. An inside of the sealing part of the present invention is sealed to be solid rather than being hollow so that there is no space to be the

"narrow gap." Hence, if an electronic field is generated as described in *Honda et al.*, generation of initial electrons cannot be expected. Therefore, those skilled in this art will not follow a teaching that could result in an increase in production cost.

Thus, since those skilled in the art could not appreciate the operational effect caused by the high-frequency magnetic field from *Honda et al.*, even those skilled in the art would not use such a costly metallic coil of the reference as a trigger wire, in the manner of our present invention whose sealing part is sealed to be solid.

As described above, the principle to promote a discharge with the use of the high-frequency magnetic field is not found in *Honda et al.*, and in addition, the reference never discloses nor suggests the claimed feature (B) of the present invention that is (i) a proximity conductor formed from a lead wire, a section of the lead wire being wound around an outer circumference of at least one of the first sealing part and a section of the light emitting part to form a wound portion, and (ii) a remaining section of the lead wire forming a lead portion that extends from the wound portion across the light emitting part in proximity to or contacting with an outer surface of the light emitting part, to a side of the discharge lamp on which the second sealing part is disposed.

Therefore, the invention pertaining to Claim 1 is inventive over *Honda et al.*

The invention recited in Claim 5 relates to a lighting method for a high-pressure discharge lamp as in Claim 1. This amendment clarifies that "a high-frequency voltage is applied to the electrode pair prior to applying a high-voltage pulse to initiate a discharge of the high-pressure discharge lamp.

This amendment is based on Figures 2 and 7 and Specification, Page 13, Line 27 through Page 14, Line 27 and the subsequent Tests from Pages 15-21. This amendment does not include any new matters.

By applying a high frequency voltage prior to applying a high-voltage pulse to initiate a discharge, a high-frequency magnetic field is generated because of the wound portion of the proximity conductor, which dramatically increases initial electrons. Thus, a discharge can be generated by applying a pulse of lower voltage than before.

The high-pressure discharge lamp pertaining to Claim 1 itself is novel. In addition, as described above, the technical idea that initial electrons are increased by the high-frequency magnetic field was not conventionally known. Thus, it is apparent that the lighting method pertaining to Claim 5 is inventive.

Note that the Paragraph [0121] indicated in the Office Action describes high-frequency lighting. However, it is understood that this paragraph does not disclose or suggest application of a high-frequency voltage prior to applying a high-voltage pulse to initiate the discharge.

The invention recited in Claim 8 relates to a lighting device for lighting a high-pressure discharge lamp as in Claim 1. Accordingly, in accordance with the amendment to Claim 5, Claim 8 is also amended.

The lighting device is for implementing the lighting method of Claim 5. As described above, as long as Claim 5 is inventive, it should be recognized that Claim 8 is also is inventive.

Claim 3 was further rejected over *Honda et al.* in view of JP 58-198327 (*Danno et al.*). However, *Danno et al.* only teaches a groove section to increase a contact area with the proximity conductor 10. It does not address the above noted deficiencies of the *Honda et al.* reference.

In addition, Claims 3, 4, 6, 7, 9 and 10 are dependent from Claims 1, 5 and 8, thereby limiting the parent claims. Accordingly, as long as Claims 1, 5 and 8 are inventive, it should be recognized that these dependent claims are also inventive.

Claims 8-11 and 13-14 were held to be obvious under 35 U.S.C. §103 over the *Honda et al.* reference.

Our discussion with Pinchus Laufer in the Office of Patent Legal Administration, who was involved in writing the Examination Guidelines for Determining Obviousness under 35 USC §103 in view of the Supreme Court decision in *KSR International Co. vs. Teleflex, Inc.* verified that the KSR decision still required a specific rationale that could not be based on hindsight for purportedly combining the elements in the prior art to meet an invention defined in the patent claims.

Mr. Laufer incorporated the following from the existing MPEP into the Guidelines.

As noted in the MPEP at §2143.02:

> A rationale to support a conclusion that a claim would have been obvious is that all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yielded nothing more than predictable results to one of ordinary skill in the art. *KSR International Co. v. Teleflex Inc.*, 550 U.S. ___, ___, 82 USPQ2d 1385, 1395 (2007); *Sakraida v. AG Pro, Inc.*, 425 U.S. 273, 282, 189 USPQ 449, 453 (1976); *Anderson's-Black Rock, Inc. v. Pavement Salvage Co.*, 396 U.S. 57, 62-63, 163 USPQ 673, 675 (1969); *Great Atlantic & P. Tea Co. v. Supermarket Equipment Corp.*, 340 U.S. 147, 152, 87 USPQ 303, 306 (1950). (underline added)

As can be appreciated from our above comments, the function taught by *Honda et al.* cannot yield the results of our present invention.

In addition, the inventions recited in our Claims 11-14 respectively relate to a high-pressure discharge lamp, a lamp unit, an image display device and a headlight device. Merely

the application of each invention differs from that of Claim 1, and, therefore, each of these claims also include, as a feature, at least a high-pressure discharge lamp as in Claim 1. Accordingly, as long as Claim 1 is inventive, it should be recognized that these claims are also inventive.

It is believed that the present claims are allowable and an early notification of the same is requested.

If there are any questions with regards to prosecution of the present case, the undersigned attorney can be contacted at the listed telephone number.

Very truly yours,

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